

### REMARKS

Claims 16, 17, 19-21, 23, 26, 28, 29, 31-33, 36-38, 41, and 43 have been amended, and claims 34 and 35 have been cancelled. Thus, claims 16-33 and 36-44 are pending in the present application. The claim amendments are supported by the specification and claims as originally filed, with no new matter being added. Accordingly, favorable reconsideration of the pending claims is respectfully requested.

Claims 17, 19-21, 23, 28, 31, 33, and 36-38 have been amended variously to correct minor typographical errors, to provide consistency in terminology, to change dependencies, or for clarity, and not for reasons related to patentability. The specification has been amended to correct minor grammatical and typographical errors.

#### 1. Rejections Under 35 U.S.C. § 103

Claims 16, 18 and 43-44 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,066,615 to Brady et al. (hereinafter "*Brady*") for the reasons set forth on page 2 of the Office Action. Applicant respectfully traverses.

Independent claims 16 and 43 have been amended to recite that the metal in the metal silicon nitride compound is at least one metal selected from the group of Sc, Co, Al, and Ni. There is no teaching or suggestion in *Brady* of an antireflective coating comprising a metal silicon nitride compound, with the metal selected from this group. Thus, claims 16 and 43 would not have been obvious over *Brady*.

Claims 18 and 44 depend from claims 16 and 43 respectively, and thus include the limitations thereof. Therefore, claims 18 and 44 would also not have been obvious over *Brady* for at least the reasons stated with respect to claims 16 and 43.

Accordingly, Applicant respectfully requests that the rejection of claims 16, 18 and 43-44 under 35 U.S.C. § 103(a) be withdrawn.

Claims 17, 19, 26, 32-36, and 41 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over *Brady* in view of U.S. Patent No. 5,116,427 to Fan et al. (hereinafter "*Fan*") for the reasons set forth on pages 2-3 of the Office Action. Applicant respectfully traverses.

*Brady* teaches in the background section that various compositions "proposed for use as photolithographic antireflection coatings include titanium nitride, titanium-tungsten, silicon nitride and amorphous silicon." (Col. 1, lines 47-50). *Brady* further states that "these various known antireflection coatings have distinct drawbacks." (Col. 1, lines 52-53). Thus, *Brady* actually teaches away from using titanium-tungsten in an antireflection coating.

The Examiner asserts that *Fan* discloses that a titanium-tungsten containing layer has a suitable antireflective characteristic. Such a layer is used as a barrier layer in *Fan* and not as part of the antireflective coating. Further, there would have been no motivation to use the titanium-tungsten taught in *Fan* in the metal silicon nitride layer of *Brady*, since *Brady* specifically states that titanium-tungsten has distinct drawbacks in an antireflection coating. Therefore, claims 17 and 19 would not have been obvious over *Brady* in view of *Fan*.

With regard to independent claim 26, there is no teaching or suggestion in *Brady* or *Fan* of the antireflective coating as recited in claim 26 comprising a metal silicon nitride compound  $M_xSi_yN_z$ , with M being at least two transition metals composed of M1 and M2. While the Examiner cites *Fan* for teaching that M1 and M2 can be Ti and W, *Fan* only teaches a nitride compound of these metals (*i.e.*, TiWN) for use in a barrier layer. In addition, as discussed above, there would have been no motivation to use the titanium-tungsten taught in *Fan* in the metal silicon nitride layer of *Brady*, since *Brady* specifically states that titanium-tungsten has distinct

drawbacks in an antireflection coating. Thus, claim 26 would not have been obvious over *Brady* in view of *Fan*.

With respect to independent claim 32 and dependent claims 33-36, there is no teaching or suggestion in *Brady* or *Fan* of the recited antireflective coating comprising a metal silicide compound, with the metal being at least one metal selected from the group of Sc, Co, Al, and Ni. Hence, claims 32-36 would not have been obvious over *Brady* in view of *Fan*.

Independent claim 41 has been amended to recite that the metal silicon nitride compound is selected from the group of tungsten aluminum silicon nitride, and titanium aluminum silicon nitride. Such compounds are not taught or suggested in *Brady* or *Fan*. Thus, claim 41 would not have been obvious over *Brady* in view of *Fan*.

Accordingly, for the foregoing reasons, Applicant respectfully requests that the rejection of claims 17, 19, 26, 32-36, and 41 under 35 U.S.C. § 103(a) be withdrawn.

Claims 20-25, 27-31, and 37-40 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over *Brady* in view of U.S. Patent No. 5,886,391 to Niroomand et al. (hereinafter "*Niroomand*") for the reasons set forth on page 3 of the Office Action. Applicant respectfully traverses.

Claims 20-25 depend from claim 16 and thus include the limitations thereof. As discussed above with respect to claim 16, there is no teaching or suggestion in *Brady* of an antireflective coating comprising a metal silicon nitride compound, with the metal selected from the group Sc, Co, Al, and Ni. *Niroomand* also does not teach or suggest such a limitation. Accordingly, claims 20-25 would not have been obvious over the cited references.

Claims 27-28 depend from claim 26 and thus include the limitations thereof. As discussed above with respect to claim 26, there is no teaching or suggestion in *Brady* of an

antireflective coating composed of a metal silicon nitride compound  $M_xSi_yN_z$ , with M being at least two transition metals composed of M1 and M2. *Niroomand* also does not teach or suggest these claimed features. Accordingly, claims 27-28 would not have been obvious over the cited references.

Independent claim 29 has been amended to recite that the metal in the metal silicon nitride compound is at least one metal selected from the group of Sc, Co, Al, and Ni. There is no teaching or suggestion in *Brady* of an antireflective coating comprising a metal silicon nitride compound, with the metal selected from this group. *Niroomand* also does not teach or suggest such a limitation. Accordingly, claim 29 would not have been obvious over the cited references.

Claims 30-31 depend from claim 29 and thus include the limitations thereof. Therefore, claims 30-31 would also not have been obvious over the cited references for at least the reasons stated hereinabove with respect to claim 29.

Claims 37-40 depend from claim 32 and thus include the limitations thereof. As discussed above with respect to claim 32, there is no teaching or suggestion in *Brady* of an antireflective coating comprising a metal silicide compound, with the metal being at least one metal selected from the group of Sc, Co, Al, and Ni. Likewise, *Niroomand* also does not teach or suggest an antireflective coating comprising such a metal silicide compound. Rather, *Niroomand* discloses antireflective structures that include layers of polysilicon and silicon nitride. Accordingly, claims 37-40 would not have been obvious over the cited references.

For the above reasons, Applicant respectfully requests that the rejection of claims 20-25, 27-31 and 37-40 under 35 U.S.C. § 103(a) be withdrawn.

2. Allowable Subject Matter

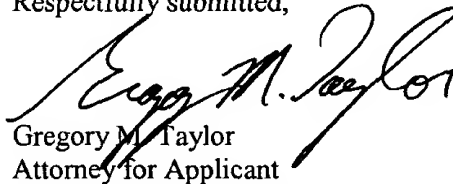
The Office Action indicated that claim 42 would be allowable if rewritten in independent form. Applicant notes that claim 42 was originally presented in independent form, so no amendment should be necessary to have claim 42 allowed.

CONCLUSION

In view of the foregoing, Applicant respectfully requests favorable reconsideration and allowance of the pending claims. In the event the Examiner finds any impediment to the prompt allowance of this application that could be clarified by a telephone interview, the Examiner is respectfully requested to contact the undersigned attorney.

Dated this 26<sup>th</sup> day of July 2002.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW THE CHANGES MADE

IN THE SPECIFICATION:

The paragraph beginning at page 12, line 2 has been amended as follows:

In order to illustrate [that] the manner in which the above-recited and other advantages of the invention are obtained, a more particular description of the invention briefly described above will be rendered by reference to specific embodiments thereof which are illustrated in the appended drawings. Understanding that these drawings depict only typical embodiments of the invention and are not therefore to be considered [to be] limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

The paragraph beginning at page 19, line 25 has been amended as follows:

The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as [illustrated] illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims and their combination in whole or in part rather than by the foregoing description. All changes that come within the meaning and range of equivalency of the claims are to be embraced within their scope.

IN THE CLAIMS:

Claims 16, 17, 19-21, 23, 26, 28, 29, 31-33, 36-38, 41, and 43 have been amended as follows:

16. (Twice Amended) A semiconductor structure comprising:  
a semiconductor substrate; and  
an antireflective coating over the semiconductor substrate, the antireflective coating [being composed of] comprising a metal silicon nitride [ternary] compound, [wherein] the metal [is] being at least one metal selected from the group consisting of Sc, [Ti, Zr, Nb, Ta, Mo, W,] Co, Al, and Ni, wherein the antireflective coating is configured to minimize reflectivity of deep ultraviolet light.

17. (Twice Amended) The semiconductor structure as defined in Claim [16] 26, wherein the metal silicon nitride [ternary] compound is selected from the group consisting of titanium tungsten silicon nitride, tungsten aluminum silicon nitride, and titanium aluminum silicon nitride.

19. (Twice Amended) The semiconductor structure as defined in Claim [16] 26, wherein [the metal] M<sub>1r</sub>M<sub>2,1-r</sub> is selected from the group consisting of Ti<sub>r</sub>W<sub>1-r</sub>, W<sub>r</sub>Al<sub>1-r</sub>, and Ti<sub>r</sub>Al<sub>1-r</sub>.

20. (Twice Amended) The semiconductor structure as defined in Claim 16, wherein:  
the antireflective coating has a film thickness [and a grain size]; and  
[the grain size of] the antireflective coating is amorphous or has a grain size that  
is less than the film thickness [or is amorphous].

21. (Once Amended) The semiconductor structure as defined in Claim 16, wherein the metal silicon nitride [ternary] compound is M<sub>x</sub>Si<sub>y</sub>N<sub>z</sub>, M is a metal, x is greater than zero, y is greater than 2x, and z is in a range from about 1y to about 5y.

23. (Twice Amended) The semiconductor structure as defined in Claim 21, wherein the antireflective coating [is] further [composed of] comprises hemispherical grained polysilicon.

26. (Twice Amended) A semiconductor structure comprising:  
a semiconductor substrate; and  
an antireflective coating upon said semiconductor substrate, the antireflective coating [being composed of] comprising a metal silicon nitride [ternary] compound M<sub>x</sub>Si<sub>y</sub>N<sub>z</sub>, wherein:  
x is greater than zero;  
y is greater than x;  
z is greater than zero and less than about 5y;  
M is at least two transition metals composed of M<sub>1r</sub>M<sub>2,1-r</sub>;  
r is in a range from 0 to 1;  
M1 and M2 are selected from the group consisting of Sc, Ti, Zr, Nb, Ta, Mo, W, Co, Al, and Ni; and  
M1 is not M2.

28. (Twice Amended) The semiconductor structure as defined in Claim 26, wherein the antireflective coating [is also composed of] further comprises hemispherical grained polysilicon.

29. (Twice Amended) A semiconductor structure comprising:  
 an electrically insulative layer upon a semiconductor substrate;  
 a patterned electrically conductive metal line upon the electrically insulative layer; and  
 an antireflective coating upon said electrically conductive metal line, wherein the antireflective coating is configured to minimize reflectivity of deep ultraviolet light, the antireflective coating [being composed of] comprising a metal silicon nitride [ternary] compound  $M_xSi_yN_z$ , wherein:  
     x is greater than zero;  
     M is at least one transition metal selected from the group consisting of Sc, [Ti, Zr, Nb, Ta, Mo, W,] Co, Al, and Ni;  
     y is greater than x; and  
     z is greater than about 0 and less than about 5y.
31. (Twice Amended) The semiconductor structure as defined in Claim 29, wherein the antireflective coating [is also composed of] further comprises hemispherical grained polysilicon.
32. (Twice Amended) A semiconductor structure comprising:  
 a semiconductor substrate; and  
 an antireflective coating over the semiconductor substrate, the antireflective coating [being composed of] comprising a metal silicide [binary] compound, wherein the metal is at least one metal selected from the group consisting of Sc, [Ti, Zr, Nb, Ta, Mo, W,] Co, Al, and Ni.
33. (Once Amended) The semiconductor structure as defined in Claim 32, wherein:  
 the metal silicide [binary] compound is  $M1_rM2_{1-r}Si_s$ ;  
 M1 and M2 are both said at least one metal and are selected from said group;  
 M1 is not M2;  
 r is in a range from 0 to 1; and  
 s is greater than zero.
36. (Twice Amended) The semiconductor structure as defined in Claim 32, wherein:  
 the metal silicide [binary] compound is  $M_xSi_y$ ; and  
 [M is tungsten,] x is 1, and [Si] y is in a range from about 1.5 to about 5.
37. (Twice Amended) The semiconductor structure as defined in Claim 32, wherein the antireflective coating [is] further [composed of] comprises hemispherical grained polysilicon.



38. (Twice Amended) The semiconductor structure as defined in Claim 32, wherein:  
the antireflective coating has a film thickness [and a grain size]; and  
[the grain size of] the antireflective coating is amorphous or has a grain size that  
is less than the film thickness [or is amorphous].

41. (Once Amended) A semiconductor structure comprising:  
a semiconductor substrate; and  
an antireflective coating over the semiconductor substrate, the antireflective coating comprising a metal silicon nitride compound selected from the group consisting of [titanium tungsten silicon nitride,] tungsten aluminum silicon nitride, and titanium aluminum silicon nitride.

43. (Once Amended) A semiconductor structure comprising:  
a semiconductor substrate; and  
an antireflective coating over the semiconductor substrate and having a thickness range from about 25 Angstroms to about 200 Angstroms, the antireflective coating comprising a metal silicon nitride compound, wherein the metal is at least one metal selected from the group consisting of Sc, [Ti, Zr, Nb, Ta, Mo, W,] Co, Al, and Ni.